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DEVELOPMENTS IN ECONOMIC ENTOMOLOGY[1]

J. W. WILSON
Central Florida Experiment Station

We have all been told on one or more occasions that at stated intervals it is desirable to take time from our daily tasks to consider the progress being made and the direction in which these changes are leading us. From such considerations there should naturally follow a reorientation of our efforts to the end that our individual activities will be in harmony with the general trend of events, provided trends are toward a desirable goal. On the other hand, such meditations may indicate that efforts should be directed toward changing these trends to a more desirable course. This thirty-fifth annual meeting of the Florida Entomological Society is a convenient and appropriate time to pause for consideration of some of the factors which have influenced the progress being made in economic entomology and the direction of future advances.

One of the factors which has and is influencing entomological progress is the application of statistical methods to the study of entomological problems. The early entomologists were concerned largely with naming and classifying insects. The development of a sizable amount of taxonomic knowledge of insects, along with the expanding agricultural acreage, and consequent increasing insect damages, created a demand for information on insect control. As the body of economic entomological knowledge grew, workers in this field became more and more aware of the need for more accurate measurements and methods for simplifying the mass of accumulated data. Workers in other fields, notably, Pearson, Harris, Pearle, and Lotka, were among the biologists who began using statistical methods during the latter part of the nineteenth century. During the second and third decades of the twentieth century, economic entomologists began employing statistical methods in the study and interpretation of their data. As an example of the awakening interest in the use of statistical methods, a symposium on this subject was led in 1924 by Hyslop, Burgess, Hartzell, Davis, Hunter, Lockwood and Larrimer at the twenty-sixth annual meeting of the Association of Economic Entomologists. At that time tests for the validity of data depended upon

[1] Presidential Address, Thirty-fifth Annual Meeting Fla. Ent. Soc., Ft. Pierce, Fla. October 9-10, 1952.

a determination of the standard deviation from the mean. During the period between 1900 to the early 1930's, progress in the techniques of statistics made rapid strides. With the publication in 1927 of Fisher's "Statistical Methods for Research Workers" and in 1935 of his "Design of Experiments", valuable tools for the critical examination of data were made available to biologists. There was a period when these tools were abused. But it has now come to be generally recognized that a carefully designed experiment is one which provides for a statistical treatment of the resulting data; and that a statistical analysis of the accumulated data provides a more critical and dependable interpretation of the results. Thus we see that during the past twenty years the use of statistical methods has brought about great changes in the methods of studying problems of economic entomology. No doubt future refinements in statistical techniques will accelerate advances in economic entomology.

Because of the present day wide usage and common acceptance of insecticides, we are inclined to forget that the general practice of insect control had its early beginnings only slightly more than one-hundred years ago. Finely ground tobacco mixed in water with lime for the control of aphids was first recommended in France in 1763. But it was not until 1828 that the volatile poison was isolated and named nicotine. In this same year of 1763 kerosene was first recommended as an insecticide to be used without modification. Although these early attempts to use kerosene and kerosene mixed with water, were very effective as insecticides, they caused severe injury to the plants to which they were applied. The first formula for an emulsion of kerosene, soap and water was published in 1874, and in 1904 the first miscible oil was placed on the market. During the period 1919 to 1923 the lubricating oil emulsions were developed for the control of scale insects. Then in the late 1920's Volck introduced the summer oils and white oil emulsions. Pyrethrum, which was widely used before World War II for the control of household insects and pests of vegetable crops, was first marketed about 1800 as a flea and louse powder. London purple and Paris green were first used as stomach poisons for the control of the Colorado potato beetle during the 1860's. Then in 1892 lead arsenate was introduced for the control of the gipsy moth. The first commercial batch of calcium arsenate was manufactured in 1912. Following the eastward spread of the cotton boll weevil, as much as 20,000 tons a year of this one

insecticide were used. The extensive use of arsenate of lead on fruits and vegetables brought about the establishment of tolerance levels for arsenic, lead and fluorine compounds. This stimulated the search for non-cumulative insecticides which resulted in the wide use of rotenone during the 1920's and 1930's. With the discovery of the insecticidal properties of DDT in 1942, economic entomology entered a new era.

This period of the past ten years has been characterized by the rapid development and release for growers' use of the chlorinated hydrocarbon and the phosphatic insecticides. This has created conditions which have drastically changed the economic entomologists' method of approaching insect control problems. In the first place these newer chemicals have provided spectacular control of a number of insects which were previously very difficult to control. As examples: pickleworm and melon worm on cucurbits are readily controlled with lindane; stink bugs and the larger plant bugs are very effectively controlled with chlordane or toxaphene; and serpentine leaf miner is very susceptible to applications of parathion. Furthermore, recent years have witnessed the demonstration of the fact that the use of the newer insecticides has advantages in the control of many insects that we previously considered satisfactorily controlled by the older insecticides. The more effective control of aphids on vegetable crops by parathion under Florida growing conditions, the reduction of tree injury and the reduction of coloring problems of early citrus by the use of parathion for scale control, are only three illustrations of advantages of the newer insecticides over those in use prior to 1942. The newer chemicals have the additional advantage, in many instances, of producing results much more rapidly than insecticides previously used. All of these factors, combined with the favorable returns growers were receiving for their crops, hastened the acceptance and general use of these insecticides. In fact, the adoption of these chemicals has progressed to the point that insecticide dealers rarely have calls for previously widely used materials such as Cryolite, Arsenate of lead, calcium arsenate and rotenone.

During the past three or four years chemists and entomologists have been developing a group of chemicals known as systemic insecticides. Because these chemicals can be absorbed and translocated from one part of the plant to another and because plants treated with these systemic insecticides remain

toxic to insects over a period of six to eight weeks, economic entomologists are keenly interested in this group of insecticides. Some of the materials in this group are selective. That is: some are toxic to plant pests and are not toxic to the beneficial insects. Some of these systemic insecticides must become a part of the physiological processes of the plant to be toxic, while others act as contact insecticides as well as systemics. Thus the systemic insecticides have opened up an entirely new and almost completely unexplored field of activity to the economic entomologists. Some of the chemists working with this group of insecticides tell us that there are very good prospects for the development of potent systemic insecticides which are less toxic to humans than those available to entomologists at present.

Another difference in our approach to insect control problems is the almost complete dependence upon chemicals for insect control. During recent years very little time has been devoted to the study of the ecological factors which influence insect abundance. In our dependence upon chemicals we have forgotten about the effectiveness of parasites and predators in reducing insect populations. In most cases we have also failed to consider the effect of the chemicals we are using upon these parasites and predators. The benefits to be derived from crop rotations and sanitation are being overlooked. I do not wish to appear to minimize the importance or the need for chemicals, but as economic entomologists we should not neglect these other methods of insect control.

Since the chlorinated hydrocarbon insecticides have been placed on the market, many of the insecticide manufacturers have expanded by several fold the number of economic entomologists on their various staffs. These entomologists employed by the commercial companies are serving three very useful purposes. First they are conducting entomological research along the lines of particular interest to their companies. Second, they are acting as liaison men between their companies and State and Federal workers. In their capacities as liaison men they are bringing to State and Federal entomologists the most recent information on the products in which their Companies are interested. In many instances they have made contributions by suggesting methods of procedure or improvements in the procedures being used. This exchange of information through these entomologists employed by the commercial companies is a definite contribution to the advancement of economic entomology.

Finally, they have become a very important and reliable medium for transmitting the accumulated information to the farmers. Prior to World War II most of the information accumulated by research workers reaching the farmer was channeled through the County Agents office. Since the end of World War II, technically trained representatives of commercial insecticide companies have made this information much more readily available to the growers. In many areas the representatives of commercial companies are now the principal channel through which farmers obtain information on disease and insect control. This is not said in a spirit of criticism of the County Agent. In most Counties there are only one or two men in the County Agent's office, while there may be available in that same County a number of technically trained representatives of various commercial companies. In actively assisting the growers with their problems of insect identification, selection, and application of insecticides, the commercial entomologists are helping increase the per acre production of food and fiber crops, thereby helping to create favorable conditions for future developments in economic entomology.

When the chlorinated hydrocarbon, phosphatic and systemic insecticides became available the problems of the toxicology of these chemicals, problems of residues upon the edible portions of crops, problems of soil residues and many other problems connected with the introduction of new insecticides demanded immediate attention. The development of solutions to these problems has required close cooperation between entomologists, chemists and other scientists. Such cooperation between these branches of science is certain to stimulate future rapid advancement in our field of endeavor by broadening the thinking and outlook of economic entomologists.

Another very definite trend which has developed during the period of the past ten years is an increased willingness of individual entomologists to cooperate more closely with other entomologists. This spirit of cooperation is not limited to individuals belonging to the same organization but is general among all having a common interest. A number of cases could be cited as illustrations but one will suffice. During the meetings of the Cotton States Branch of the Association of Economic Entomologists held in Atlanta in February, 1952, entomologists from most of the Southern States, the United States Department of Agriculture, and some insecticide companies gathered in a hotel

room to discuss corn earworm control problems. This gathering was not a part of the scheduled program. At this meeting, methods of attacking the corn earworm problems were discussed and these problems were separated into related groups. It was agreed that more progress could be made if each man present select a phase or phases of the problem upon which he would work. In this way the whole corn earworm control problem was covered and each particular phase of the problem will receive more attention than if each man attempted to cover the whole problem alone. It was further agreed that each man present would make every effort to participate in a similar discussion at the next meeting of the Cotton States Branch. A meeting of this same nature had been held during the parent Association meetings in December. This mutual exchange of information and coordination of effort is apparent among most economic entomologists. It is an attitude which all of us can encourage and help promote.

All of these changes indicate that the science of economic entomology is alive and dynamic. Because it is alive and dynamic, more and more young men will be attracted to economic entomology as a profession. Through the combined efforts of present and future members of our profession, the science of economic entomology will move on to greater developments and larger services to mankind.

INSECT AND MITE CONTROL PROBLEMS ON LAWN AND GOLF GRASSES [1]

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During the past year heavy losses of turf grasses have occurred in lawns, golf courses and other recreational areas in southeastern Florida as a result of insect infestations. Damage amounting to thousands of dollars was caused by chinch bugs on lawns of St. Augustine grass, *Stenotaphrum secundatum* (Walt.) Kuntze. Thousands of dollars also have been spent in efforts to keep golf grasses in good condition where scale insect infestations had destroyed or impaired greens and fairways of Bermuda grass, *Cynodon dactylon* (L.) Pers. Inquiries have been received recently for any known method of scale insect control on grasses on airfields and flight strips.

Control of scale insects and mites on grass presents a new problem in turf culture, in addition to the older ones discussed briefly by Kelsheimer (1952), such as control of chinch bugs, white grubs, webworms, and leafhoppers. Factors which may be responsible for the increase of these pests on grasses include the following: increase of solid or nearly solid plantings of species of grass susceptible to these pests, certain practices used in irrigation and fertilization, and the widespread use of insecticides which may kill other insects but permit scale insects and mites to increase.

St. Augustine grass is preferred by many Florida residents for lawns. This grass, except for chinch bug susceptibility, has many features which make it favored for use in lawns. Bermuda grass is used on nearly all golf courses. Although centipede grass, *Eremochloa ophiuroides* (Munro) Hack., Manila grass, *Zoysia matrella* (L.) Merr., and carpet grass, *Axonopus affinis* Chase may replace St. Augustine grass on lawns, no such satisfactory replacement is known for Bermuda grass on golf courses.

SCALE INSECTS.—Rhodes grass scale, *Antonina graminis* (Maskell), and Ruth's scale, *Odonaspis ruthae* Kotinsky, infest Bermuda grass. Rhodes grass scale infests St. Augustine grass, but less commonly than Bermuda. The sugarcane scale, *Targionia sacchari* (Ckll.), determined by G. B. Merrill, was taken

[1] Florida Agricultural Experiment Station Journal Series, No. 103.

from St. Augustine and Bermuda grass but has been of no economic importance.

Infested grass becomes yellow and brown in color. Severe and advanced stages of infestations cause death of the grass. Bare brown patches appear in fairways and on the greens of golf courses as a result of scale infestations. Some areas in golf courses are infested with Rhodes scale; others are infested with Ruth's scale. Some areas are infested with both species.

Chemical control of these scale insects has not been obtained. Oil emulsion at 2.4 gallons per acre in 150 gallons of water was reported by Wene and Riherd (1950) to have controlled the crawler stage of Rhodes grass scale up to three days after the application, but to have had little or no effect on the adult scale. Plot treatments of light and heavy applications of different insecticides were made on golf course grass in the Miami area. These included maximum amounts of the following insecticides per acre: Parathion, 15% wettable powder, 100 lbs.; oil emulsion 2.4 gals.; EPN, 27% wettable powder, 3.7 lbs.; malathon emulsion, 5 lbs./gal., 1/5 gal.; sodium selenate 200 lbs.; Systox, 4 lbs. per gal., 48 gals.; and G-23611 (a member of the urethane group), 25% emulsion, 48 gals. Parathion, one pound active ingredient per acre was applied in one experiment with different amounts of water, ranging from 0.01 to 1.00 inch. Results of scale counts in all experiments treated with these materials showed that no scale control had been obtained three weeks after the applications. Sodium selenate at 100 or more pounds per acre killed part of the grass treated. All other treatments were safe.

MITES.—Two species of mites taken from St. Augustine grass were identified by E. A. McGregor from collections sent to him. One species was *Paratetranychus stickneyi* McG. and the other was a new species, possibly a new genus, but close to his *Monoceronychus*. *P. stickneyi* was reported by McGregor (1950) as feeding on numerous grasses, including Bermuda grass. St. Augustine grass was not listed and is evidently a new host record.

Symptoms of mite infestations on grass are similar to those of mite infestations on other plants. Blotching and stippling of the infested leaves result from mite feeding. In advanced stages of infestations the blotched areas may become brown and finally die. Browned and dead stolons and dead areas are common in heavily infested grass.

Observations were made in one yard before and after an application of sulfur. Although the exact amount used is unknown, several pounds of sulfur per acre had been applied. No mite was found in the treated yard. This suggested that the use of sulfur may provide a simple solution to the control of the mites.

CHINCH BUG.—Chinch bug, *Blissus leucopterus insularis* Barber, control has been accomplished many times in St. Augustine grass by applying four pounds of either DDT or chlordane per acre, or by applying one pound of gamma-isomer of benzene hexachloride per acre. There have been many times, however, in which the same and larger amounts of these insecticides failed to give control. Although no positive explanation for this can be made, several factors may influence the effectiveness of treatment. These include the following: Variations in depth of turf, amount of rainfall, soil type, and thoroughness of application. Partial control of the bugs may reduce large populations to the point where they will be unnoticed, but the few remaining may spread and increase under especially favorable conditions and soon reappear in destructive numbers.

Several experiments were conducted in 1952 in Coral Gables and Fort Lauderdale, with different insecticides for chinch bug control on lawns. Some of the results are presented herewith.

Different amounts of several insecticides were tested to determine dosage effects on chinch bug control. Maximum quantities of all insecticides tested in the dosage series and percentage control obtained are given as follows:

Material	Amt. used per acre	Percentage Control After 5 days	After 9 days
Aldrin, 20% w.p.	200 lbs.	97	58
Benzene hexachloride, 10% gamma-isomer, w.p.	200 lbs.	87	97
Chlordane, 8 lbs./gal. emul.	30 gals.	50	—
DDT			
50% w.p.	240 lbs.	97	96
2 lbs./gal. emul.	120 gals.	100	—
Dieldrin, 25% w.p.	128 lbs.	94	78
EPN, 27% w.p.	22.2 lbs.	56	0
Heptachlor, 20% w.p.	160 lbs.	87	0
Parathion, 15% w.p.	75 lbs.	90	100
Sabadilla dust, 20%	320 lbs.	68	53
Systox, 3 lbs./gal.	5 gals.	94	55
Toxaphene, 40% w.p.	300 lbs.	85	79

Other insecticides, endrin, G-23611, isodrin, lindane, malathon, Metacide, methoxychlor, NPD, TDE, and TEPP were tried —but not in dosage series. A few mixtures of different insecticides were tried. All insecticides except the sabadilla dust were applied with ⅓ or ½ inch of water. Sabadilla dust was scattered over the plots, then ⅓ inch of water was sprinkled on the dust.

All insecticides tested gave some control. Extremely large amounts of insecticides, however, were required to give high degrees of control. All treatments appeared safe to the plots treated; no phytotoxicity was observed in any plot.

In view of the effectiveness of DDT and its wide use by the public, it has been the suggested insecticide for use in chinch bug control. Since DDT may give rise to increased scale insects and mites, and since parathion controlled the chinch bug, there are reasons to look with some favor on parathion or some other phosphatic insecticide for pest control on grasses. Sulfur may be used for mite control, combined with the insecticide, if needed. Considerable experimentation is needed, however, to determine effective pest control on grasses.

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PARATHION FOR CONTROL OF PURPLE SCALES ON EARLY VARIETIES OF ORANGES

HERBERT SPENCER AND PAUL A. NORMAN [1]

Control of the purple scale, *Lepidosaphes beckii* (Newm.) on early varieties of oranges has been a troublesome problem for citrus growers. Infestations often develop in the fall, and oil-emulsion sprays applied for control after mid-July retard coloring of the fruit and delay internal maturity. Many Hamlin oranges so sprayed do not reach maturity standards that permit shipment to the market.

In 1947 and 1948 experiments (Spencer *et al*, 1952) on Valencia (late) oranges showed that purple scales could be controlled as well with parathion as with oil-emulsion sprays. Further, the fruit sprayed in the fall with parathion colored and matured normally, and was of much better quality than that sprayed with oil emulsion. This work suggested the possibility of using parathion to control scales late in the year on early varieties.

EXPERIMENTS IN 1949-50

Accordingly, in 1949 six cooperative experiments [2] were set up to compare oil emulsion with parathion for control of scales on early oranges, and to study the effects of these insecticides on coloring, maturity, and internal quality of the fruit. There were five groves of Hamlin oranges and one of Parson Browns (grove 5). In each grove there was a block of 70 trees (7 rows of 10 trees each), where 7 spray programs were compared over a 2-year period, each program being applied to 10 trees. The spray programs are shown in table 1.

The oil emulsion, a 90 percent cream-type concentrate, was added to water in the spray tank to give a spray containing 1.25 percent of oil. Two pounds of 15 percent wettable parathion per 100 gallons of water was used with 5 pounds of wettable sulfur added for controlling the citrus rust mite, *Phyllocoptruta oleivora* (Ashm.). Power sprayers of 500-gallon capacity were

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[1] United States Department of Agriculture, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine.

[2] Paul L. Harding and Milliard B. Sunday, of the Orlando, Fla., laboratory of the Bureau of Plant Industry, Soils, and Agricultural Engineering, cooperated in the quality studies; grower cooperators were the Lake Region Packing Association, Tavares, Fla.; W. J. Howey Company, Howey in the Hills, Fla.; and C. M. Stecher, Fort Pierce, Fla.

TABLE 1. NUMBER OF LIVING PURPLE SCALES PER LEAF ON EARLY VARIETIES OF ORANGE TREES TREATED WITH OIL EMULSION AND WITH PARATHION, 1949-50.

Grove	1	2	3	4	5	6
Size of trees	Large	Small	Medium	Very Large	Medium	Large
In 1949 Before Spraying						
Scales per leaf	6.85	4.59	8.10	8.55	5.39	2.62
Sampling date (1949)	June 15	June 15	June 16	June 16	July 22	June 29
After 1949 Sprayings						
Programs—						
Untreated trees	21.40	31.02	2.95	15.62	2.60	27.34
Oil, June	12.61	11.37	2.73	8.74	2.93	22.38
Parathion + wettable sulfur, June	12.29	18.20	5.15	6.53	3.40	20.69
Oil, Aug.	13.24	9.00	1.12	3.75	1.62	14.23
Parathion + wettable sulfur, Aug.	12.56	13.90	.48	.28	.61	11.73
Oil, June and Aug.	5.17	6.41	.70	3.52	1.19	15.46
Parathion + wettable sulfur, June and Aug.	8.39	13.57	.17	.44	.13	6.32
Differences required for significance at—						
5% level	4.34	4.37	1.14	2.52	1.22	8.87
1% level	5.78	5.82	1.50	3.35	2.23	11.82
Sampling date (1950)	Apr. 12	Mar. 10	Jan. 18	Feb. 3	Feb. 28	May 22
After 1950 Sprayings						
Programs—						
Untreated trees	24.45	29.14	12.42	27.70	3.47	18.02
Oil, June	3.55	1.38	.66	1.89	.51	10.57
Parathion + wettable sulfur, June	3.94	7.44	.45	3.17	1.31	7.20
Oil, Aug.	9.44	1.62	.72	5.33	.74	5.87
Parathion + wettable sulfur, Aug.	1.71	3.97	.37	.73	.32	2.28
Oil, June and Aug.	.85	.54	.13	.24	.06	2.82
Parathion + wettable sulfur, June and Aug.	.36	1.57	.05	.12	.08	1.99
Differences required for significance at—						
5% level	4.06	4.17	.35	1.27	.24	3.15
1% level	5.42	5.56	.46	1.70	.32	4.19
Sampling date (1950)	Oct. 6	Nov. 3	Nov. 29	Jan. 11, 1951	Jan. 29, 1951	Dec. 18

run at 600 to 800 pounds pressure. Two leads of hose were used, each with a No. 7 disk and either a double Boyce gun or a single orchard gun. The leaves, fruit, and wood of each tree were covered thoroughly with the spray.

SAFETY PRECAUTIONS. The safety precautions printed on each parathion package were followed closely. Parathion respirators, rubber gloves, and coveralls or slickers were worn by the spray hands, the spray mixer, and the truck driver. Workers washed their hands and faces frequently in soap and water. The antidote, atropine sulfate, was available in the spray-truck cab but was not needed. The safety precautions recommended for handling parathion should be followed carefully, as the material is very poisonous.

Control of Purple Scales

Control results were based on leaf samples collected just before the first spraying and again each year after the fruit was picked. Each sample consisted of 20 leaves clipped, at chest level, from around each tree. In the laboratory these leaves were examined with binocular microscopes, and the numbers of living purple scales present on half of the upper and half of the lower surface of each leaf were recorded. The spray results are summarized in table 1.

Natural increase of purple scales during the 2 years can be estimated for the control trees in each grove. On these trees infestations ranged from 2.62 to 8.55 living scales per leaf at the start and from 2.60 to 31.02 per leaf at the end of the 1949 season. Curiously enough, experiments 3 and 5 showed reductions in infestation without the use of any scalicide. At the end of the 1950 season in all experiments except the Parson Brown block (grove 5) the control trees had high infestations of purple scales. In this block the unsprayed trees had slightly more scales per leaf than at the end of 1949 but not so many as at the beginning of the study. However, the infestations were heavy enough in both years to show differences between treated and untreated trees.

Oil-emulsion sprays applied in June gave good results. Better control was had with an oil spray applied in August or with two oil sprays, the first in June and the second in August.

In these experiments there were 36 direct comparisons of oil and parathion applied on the same days. In 13 comparisons lower infestations followed the use of the oil emulsion; in 23

they were lower after using parathion. But the differences were slight and reached the 5 percent level of statistical significance in only 16 comparisons, in which lower infestations were demonstrated after oil in 7 cases and after parathion in 9.

These data indicate that after a June spraying with either oil or parathion there is time enough for heavy infestations to build up from survivors before cold weather. This is probably the explanation of the generally higher infestation levels at sampling dates with the June sprays over the August sprays. With low levels of infestation in a grove, as in grove 5, a single spraying with oil emulsion in July or with parathion in August or September might be adequate. With heavier infestations one might use an oil spray in June and a parathion plus wettable sulfur spray in the fall; or both summer and fall sprays could be parathion plus wettable sulfur. Either program would control heavy infestations without harmful effect on color or maturity of these early varieties of oranges.

Effect on Coloring and Fruit Quality

Harding (1950, 1953) has published findings from these experiments on coloring and fruit quality. Fruit from parathion-sprayed trees degreened earlier than fruit from unsprayed trees and much earlier than that from trees sprayed with oil. It was also definitely superior in total solids content. It met legal maturity standards earlier than did the oil-sprayed fruit. The depressing effect of the oil spray on degreening and on solids was much greater when it was applied in August than in June. Citric acid and ascorbic acid contents of the fruit were not changed by the parathion sprays but were lowered by the oil sprays.

EXPERIMENTS IN 1951-52

One question still remained to be answered after the cooperative experiment had been completed. It was whether lesser amounts of parathion per 100 gallons would give adequate control. If so, costs of spraying would be reduced for the growers. Grove 6, of Hamlin oranges, was retained for this supplemental experiment.

A prespray estimate of infestations in the seven treatment plots, made on June 20, showed 3.59 to 5.51 living purple scales per leaf, and the slight differences were not statistically significant. The same spray materials were used as in 1949 and

1950, but in some programs the concentration of parathion was reduced. Two applications were made to each plot on June 27 and September 10. All the sprays except the oil emulsion contained 5 pounds of 90 percent wettable sulfur per 100 gallons. The results, based on counts made on April 29, 1952, are given in table 2.

TABLE 2. EFFECTS OF REDUCING THE CONCENTRATION OF PARATHION IN SPRAYS, ON CONTROL OF PURPLE SCALES.

June spray	September spray	Number of scales per leaf
No oil or parathion in either spray		12.23
Oil (1.25%), no sulfur	No oil or parathion	7.88
Parathion (15%) 1 lb.	Parathion (15%) 1 lb.	1.18
1 lb.	No oil or parathion	4.01
2 lb.	No oil or parathion	4.18
No oil or parathion	Parathion (15%) 1 lb.	1.83
No oil or parathion	2 lb.	1.24
Difference required for significance at 5% level		3.02
	1% level	4.03

During the 10 months the experiment ran, the number of purple scales increased from 4 to 12 per leaf on trees that received neither oil emulsion nor parathion. Trees sprayed with oil emulsion in June and with wettable sulfur for rust mite control in September showed highly significant control, but by April 1952 the infestations had increased to nearly eight scales per leaf. A single spray in June containing either 1 or 2 pounds of 15 percent parathion per 100 gallons allowed too much fall build-up of purple scales. A single oil-emulsion spray in June was definitely inferior to parathion in June. Where either strength of parathion was used in September, infestations were low until April 1952, but there was a considerable build-up during the summer of 1951 before the late sprays were applied. Sprays containing 1 pound of 15 percent parathion per 100 gallons, applied in June and again in September, held a moderately light infestation to low levels throughout the year.

COST COMPARISONS

In controlling purple scales on Hamlin or other early oranges, growers must consider the costs of proposed spray programs. Early and late oil-emulsion sprays are no longer thought to be desirable because of the detrimental effects of late oil sprays on the color, maturity, and quality of the fruit. A single oil spray

before mid-July does not prevent fall and winter infestations and, if used, should be followed by parathion plus wettable sulfur in the fall. However, since the oil emulsion cannot be added to the regular sulfur spray for control of rust mites because of its incompatibility, an extra spraying is necessary. Satisfactory control of purple scales may be had from early summer and fall sprays of parathion, which can be added to the regular wettable sulfur sprays applied at these times for rust mite control.

Costs of materials for these experiments were 31 cents per gallon for the oil emulsion and 45 cents per pound for the 15 percent wettable parathion. The cost of the extra application, where oil emulsion was used, was $1.35 per 100 gallons. Program costs were calculated on the basis of cost of materials per 100 gallons, excluding the rust mite control, which would be the same for all programs. On this basis the early oil plus late parathion schedule cost 47 cents for the oil, $1.35 for the extra spraying, and 45 cents for the parathion in the fall spray, a total of $2.27 for the year. Two one-pound applications of parathion cost 90 cents; two two-pound sprays cost $1.80 for materials for scale control. The cost of control was less with two applications of parathion than with the early oil plus late parathion sprays for heavy infestations, even when the heavier concentration of parathion was used.

PARATHION RESIDUES

Boxes of Hamlin and Parson Brown oranges were picked in December 1949 for analyses of parathion residues on the fruit skin, in the peel, and in the juice. These analyses [3] show that 4 months after the August sprayings and 6 months after the June sprayings less than 0.01 part per million of parathion remained on the fruit skin. There was no parathion in the juice, the edible portion. However, there were traces in the orange peel, even after 6 months. The amount, when calculated on the basis of total weight of fruit in the sample, ranged from 0.18 to 0.62 parts per million. If calculated on the basis of the weight of the peel alone, the amount in the peel did not exceed 2.89 parts per million. Most of the small amount of peel that is used in cattle feed is processed by heat, so this quantity of parathion is not thought to be potentially dangerous. In these analyses

[3] By Jack E. Fahey, of the Vincennes, Ind., laboratory, Bureau of Entomology and Plant Quarantine.

and in those made for other experiments no parathion was found in the fruit juice, even when two sprays containing heavy concentrations were used each year.

SUMMARY

Cooperative experiments were undertaken in Florida in 1949 to compare oil emulsion with parathion for the control of purple scales on early varieties of oranges.

Parathion added to rust mite sprays of wettable sulfur in June and August controlled purple scales, *Lepidosaphes beckii* (Newm.), as well as did oil emulsion sprays applied at the same times. Single sprays, either of parathion or of oil, did not give year-around control. Two pounds of 15 percent wettable parathion per 100 gallons of spray, in June and in August, controlled heavy infestations of purple scales, but with moderately light infestations in 1951, one pound applied in June and in September was sufficient.

Cost of control was less with two applications of parathion than with oil emulsion, because parathion can be added to regular rust mite sprays, whereas oil-emulsion sprays are extra, oil emulsion not being compatible with sulfur.

Parathion residues at picking times were present in the orange peel, but no trace was found in the juice.

Oil emulsion sprays applied in August retarded coloring of the fruit, lowered total solids (sugars) in the juice, and delayed the time of reaching legal maturity standards. Parathion in the August spray allowed fruit to color and mature normally.

From these experiments control of purple scales with parathion appears to be a definite improvement over that with oil-emulsion sprays formerly used on early varieties of oranges.

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THE NYMPH OF MIATHYRIA MARCELLA Selys (Odonata)

Minter J. Westfall, Jr.
Department of Biology
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Recently Mr. Ellis Lanquist, a graduate student in Biology at the University of Florida, brought to me for determination two Libelluline nymphs which he had collected in Peace Creek, 5 miles northeast of Bartow, Polk County, Florida, on October 19, 1951. One was obviously in the last instar and the other about half-grown. These specimens did not fit the description for any known nymph.

I visited Mr. Lanquist's collecting station on April 18, 1952. Near the creek there were several shallow marshy ponds. In one of them, almost completely covered with water hyacinths, I began using a Needham scraper around the edge in a growth of other small aquatic plants. Nymphs of *Erythemis simplicicollis* and various Zygoptera were abundant. Soon the first nymph like Mr. Lanquist's was found. Several others in the last instar were discovered, one with swollen wing pads. When captured they were very active, making their presence known at once.

Before leaving this area an adult of *Miathyria marcella* was taken and another seen. I began to suspect that the nymphs were of that genus and species. They were taken back to Gainesville and in the laboratory, two females of *Miathyria marcella* emerged April 24 and May 5. A third was attacked by ants and killed while emerging. Other smaller nymphs were successfully kept through several instars. On a diet of small leeches they lived well in finger bowls.

Upon studying the Libelluline keys and descriptions of *Miathyria* it soon became apparent why I was unable to identify the first nymphs. They were quite different from the nymph that had been referred to this genus. My nymphs had no dorsal hook on segment 9, whereas all the keys and the one available figure showed a strong one in *Miathyria*.

The nymph of *Miathyria* seems to have been first described by supposition in an article on the Odonata of Porto Rico and the Virgin Islands by Dr. Elsie Broughton Klots in 1932. She had "a single nymph collected at Coamo Springs, April 4, by Professor Needham and several from Georgetown, April 17" which she believed to be *Miathyria marcella*. A specimen was figured in that paper.

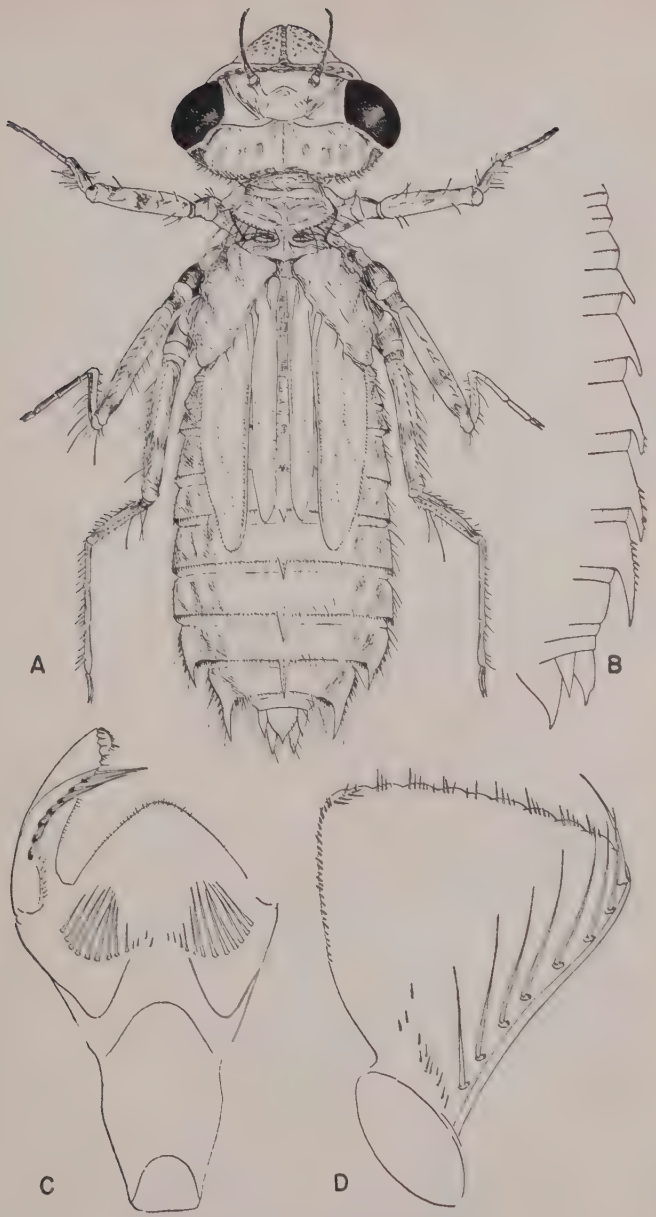
Dr. James G. Needham (1933) recorded *Miathyria marcella* for the first time in the continental United States on the basis of a nymph collected from a roadside ditch between Fort Pierce and Okeechobee, Florida. I have found this nymph in the Cornell collection and identified it as *Cannacria gravida*. Bick, Aycock and Orestano (1950) recorded adults of *Miathyria marcella* taken in Florida and Louisiana in 1949, thus definitely establishing the species as from the continental United States. My first adults were taken in September 1950 in Orange County, Florida. Since then I have seen and collected a number in Highlands, Orange and Alachua counties.

In February, 1936, Dr. C. F. Byers, in describing the nymph of *Brachymesia gravida* (now considered to be in the genus *Cannacria*) commented on Klots' description of the nymph of *Miathyria* by writing, "The nymph so described closely resembles the reared material of *Brachymesia gravida* in the writer's possession, the chief differences being in the number of lateral and mental setae. *Brachymesia herbida* (Gundlach) is the species of the islands, while *Brachymesia gravida* has long been known as an inhabitant of the United States". Dr. Byers, included in his key the nymph of *Miathyria* as described by Klots, separating it from his *Brachymesia* (*Cannacria*) by the number of lateral and mental setae only.

Needham and Fisher in June, 1936, published a paper on the nymphs of North American Libelluline dragonflies in which several genera were described for the first time. In the addendum, mention is made of the description of *Cannacria* (*Brachymesia*) *gravida* by Byers. The paper closes with the statement, "In 1930 he (the senior author) collected a nymph of *Miathyria* in the Botanical Garden at Georgetown, British Guiana, and determined it to that genus by its very distinctive venation".

Julio Garcia-Diaz in his paper on the Insects of Puerto Rico (1938, p. 62) recorded a nymph of *Miathyria marcella* from "Rio Piedras, Forestry Department pool, February 7, Needham". It is assumed that this nymph agreed with those previously described for the species.

In the Cornell University collection I have found a vial with three nymphs in it and bearing the label "*Miathyria marcella* Selys, Georgetown, Br. Guiana, 13/IV/30". One of the nymphs is in the last instar and the right wing pads have been removed. Except for the day of the month, the data agrees with that



EXPLANATION OF PLATE

A. Nymph of *Miathyria marcella* Selys.
B. Lateral view of abdomen to show dorsal hooks and appendages.
C. Mentum of labium with one lateral lobe attached.
D. Lateral lobe of labium.

given in Dr. Klots' original description and the specimens agree with her figure. A second vial contains an exuvium with the label "*Miathyria?*, Botanical Garden, 13 April '30". A third vial contains a half-grown nymph with the label "*Miathyria* sp.? Coamo Springs 4 April 1930". The specimens in all three of these vials are *Cannacria herbida*. In the collection I was able to find only one nymph of the true *Miathyria*, one from Artemisia, Cuba, 29/III/'39. One pair of wing pads has been removed and there are notes in Dr. Needham's file about this specimen from Cuba. He recently told me that the Cuban nymph agreed with the original one he determined from Georgetown on venation. Apparently the nymphs in these vials had been mixed and the Georgetown specimen lost before Dr. Klots unfortunately described the nymph of the genus erroneously from the specimens of *Cannacria herbida*.

From the foregoing discussion it is evident that the true nymph of the genus *Miathyria* has never been described. Therefore, I present here a description of the reared material. The drawings were prepared by Miss Esther Coogle, staff artist for the Department of Biology at the University of Florida.

Miathyria marcella (Selys)

NYMPH: Length when grown 16.5-17.5 mm.; abdomen 9.5; hind femur 4.5; width of head 5; width of abdomen 5.

Head with eyes broadly rounded, extending along the lateral margins a little more than one-half the distance from the base of the antennae to posterior margins of head. Posterior angles broadly rounded, clothed with numerous strong hairs.

Labium with many small brown spots on outer surface, especially on the lateral lobes. Lateral setae 7; mental setae 7 long ones in a series plus 3-4 much smaller ones set off at an angle from them near the median line. Three appear to have only 6 larger mental setae, but a much smaller seventh stands at the outer end of the series. Opposed edges of the lateral lobes with about 10 very low teeth or crenulations, each with a group of about 4 marginal setae which are graduated in length.

Each leg in well-colored individuals with two dark rings near the apex of femur.

Abdomen brown, some slight indication of a pattern visible dorsally near the lateral margins of the segments. Wing pads extending to rearward across segment 7 in last instar nymphs with normal telescoping of segments. Dorsal hooks present on segments 4-8, a small one also evident on 3 in some specimens, the hooks increasing in size to rearward. Hook on 8 in specimens with normal telescoping reaching to rearward slightly beyond the posterior margin of segment 9. Lateral spines on 8 and 9 large and slightly incurved; lengths expressed in tenths of the middorsal length of their respective segments are as 8 and 15. Superior appendage broad

and short, about three times as long as the middorsal length of segment 10. The relative length of the caudal appendages expressed in tenths of the length of the inferior pair would be: laterals 6, superior 7, and inferiors 10.

SPECIMENS STUDIED: 17 nymphs from Polk County, Florida, two of them reared, and three definitely not in last instar; collected October 19, 1951 and April 18, 1952; one nymph from Artemisia, Cuba, April 29, 1939.

The specimen from Cuba seems to be identical with the others, though it is only 14.5 mm. long and has only 6 lateral and 6+ 3 mental setae. It appears to be in the last instar. Florida nymphs only 11 and 13 mm. in length have 7 lateral setae and 7 mentals in the first series.

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NOTE: It has been called to my attention that a paper by Dr. George H. Bick, *The Nymph of Miathyria marcella* (Selys), was published in the Proceedings of the Entomological Society of Washington, 55(1): 30-36, February, 1953. It is unfortunate that this duplication of effort was not recognized earlier, but in view of the fact that Dr. Westfall's paper was already in page proof before Dr. Bick's paper was discovered, I did not withdraw the paper published above.—Editor.

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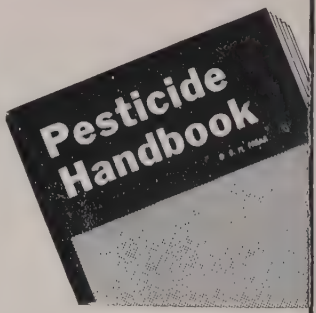

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A NEW VELIA FROM MISSISSIPPI (HEMIPTERA: VELIIDAE)

C. A. WILSON
Department of Zoology and Entomology
Mississippi State College

This new species of Velia was collected by the writer in 1949 from a small ditch partly filled with water at Fearn Springs in Winston County, Mississippi. Several subsequent visits to this same locality have failed to yield additional specimens of this species.

Velia paulineae new species

(Plate 1)

APTEROUS MALE: General shape, elongate-slender. Head elongate, with narrow median longitudinal sulcus evident on anterior two-thirds of head and disappearing posteriorly; long hairs covering anterior portion of tylus and along posterior-dorsal margins of compound eyes. Antennae long, slender and thickly clothed with intermixed long and short hairs; length of antennal segments as follows: I, 0.93 mm.; II, 0.68 mm.; III, 0.70 mm.; IV, 0.61 mm.; first antennal segment slightly curved and twice as thick as the other segments; second, third and fourth segments all of about equal thickness. Eyes globose, with large, prominent facets; width across eyes, 0.65 mm. Pronotum with large grayish-white callouses laterally on anterior portion; with median longitudinal carina extending entire length, becoming more prominent on central portion of pronotum; lateral pronotal horns prominent and pointed at tip; posterior lobe of pronotum very coarsely punctate, with about 20 punctures; posterior margin of pronotum with a fringe of scattered, fine, long hairs; width across pronotum at widest point, 0.85 mm.; length of pronotum, 1.13 mm. Abdomen narrow, elongate and with sides strongly curved upward; dorsal abdominal segments covered with short, pubescent hairs and with a few scattered longer hairs; width across abdomen dorsally at fifth segment, 0.75 mm. Genital segment elongate, pointed, covered with short and long hairs; length of genital segment, 0.52 mm. Posterior surface of femora and tibia of all legs with two rows of short, stout, black spines, and femora and tibia of hind legs with an additional row of longer, pointed spines. General color of antennae brown; head, reddish-brown; anterior lobe of pronotum, yellowish-brown to brown; posterior lobe of pronotum creamy-brown; dorsum of abdomen dark-brown to brown; genitalia, yellow; legs, with alternate brown and creamy-white bands. Length from tip of tylus to tip of abdomen, 4.25 mm.

COMPARATIVE NOTES: This species is related to *Velia watsoni* Drake,[1] but may be readily distinguished by the following

[1] Drake, Carl J. 1919. A new species of *Velia* from Florida (Hem.-Het.). Florida Buggist, 3(1): 1-2.

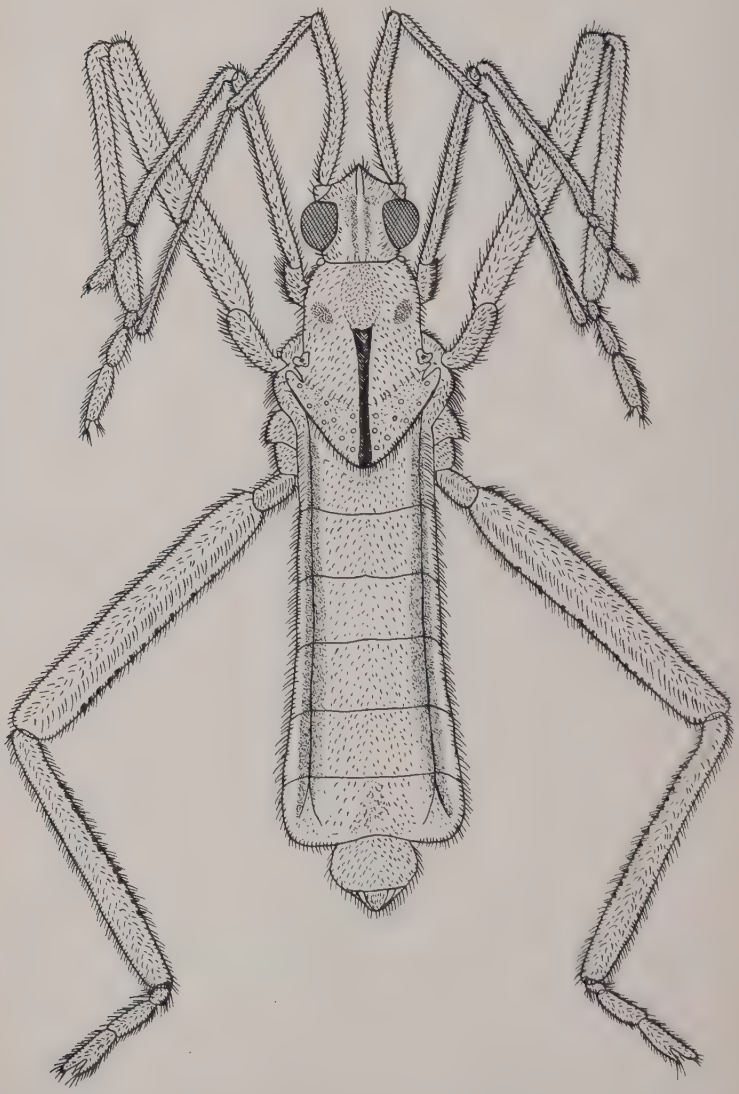

Plate 1 — *Velia paulineae* new species, dorsal view of male.

differences. These differences were obtained by comparing the holotype of this species with a male paratype of *Velia watsoni* Drake. The results of this comparison are presented in tabular form herewith:

Species	Width across eyes	Length of antennal segments	Width across pronotum	Length of pronotum + scutellum	Width across 5th abdominal segment	Length of genital segment	Total length
V. watsoni	0.69 mm.	I, 1.03 mm. II, 0.75 mm.	1.06 mm.	1.37 mm.	1.12 mm.	0.28 mm.	4.80 mm
V. paulineae	0.65 mm.	I, 0.93 mm. II, 0.68 mm.	0.85 mm.	1.13 mm.	0.75 mm.	0.52 mm.	4.25 mm

The pronotal horns are more pronounced in *Velia watsoni* Drake than in *Velia paulineae* new species. Also, the general shape of *Velia watsoni* Drake is more robust, whereas *Velia paulineae* new species, is slender as shown by the comparative measurements tabulated above.

BIOLOGICAL NOTES: The single specimen that was collected came from damp soil along the edge of a small, temporary upland ditch. The water was only about two inches deep and contained some vegetation.

LOCALITY DATA: Fearn Springs, Mississippi, September 11, 1949. One male was collected.

LOCATION OF TYPES: Holotype, male in the collection of the author. Type locality, Fearn Springs, Mississippi.

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A NEW LACCOPHILUS FROM FLORIDA, WITH NOTES ON OTHER SPECIES OF THE GENUS (COLEOPTERA: DYTISCIDAE) [1]

FRANK N. YOUNG

The new species of *Laccophilus* described below is apparently distinct from any of the described West Indian or South American forms. It will probably, however, be found to have a wider distribution in the Antilles.

Laccophilus vacaensis sp. n.

DIAGNOSIS: A moderately large *Laccophilus* belonging to the group of species which lack the coxal file in both the male and female and which have the prosternal process short. *Vacaensis* can be distinquished from *proximus* Say, which it somewhat resembles in color pattern, by the lack of the coxal file, the different structure of the male genitalia and last abdominal sternite, and by the strongly dilated anterior and middle tarsi of the male. It is readily distinquished from *venustus* Aubé and allied forms by the lack of a pale fascia across the bases of the elytra, the uniform speckling of the elytra, and by the more dilated male tarsi. The dilatation of the male anterior and middle tarsi of which the fifth segment is elongate and nearly three times as long as the fourth, together with the color pattern, group characters, and the genitalia should separate it from all described species.

HOLOTYPE MALE: Form oblong oval, widest at about the middle of the length, moderately convex. Total length 4.53 mm.; greatest width 2.48 mm. Width at base of pronotum 2.1 mm.; width at apex of pronotum 1.3 mm.; length of pronotum at midline 0.78 mm. Length of prosternal process 0.59 mm.; base of prosternum to apex of coxal laminae 2.16 mm. Width between eyes 0.78 mm. *Head*: Vertex microreticulate with scattered minute punctures; a few coarser punctures near eyes and around frontal depressions as usual in the genus. Microsculpture with meshes elongate and irregular, rather lightly impressed; toward the sides and base of head the meshes become more elongate and more deeply impressed suggesting the whorls of fingerprints. *Pronotum*: Sides rather strongly convergent anteriorly. Disk minutely, irregularly punctate, but a band of coarse punctures irregularly and sparsely distributed along the anterior margin just behind the head and some similar punctures at posterior angles and partly along side margins. Microsculpture with meshes less elongate and more irregular than on vertex of head; many of the meshes not closed giving a vermiculate appearance. *Elytra*: Microsculpture with lines more deeply impressed than on head or pronotum, the meshes more regular (roughly hexagonal) and much smaller. Punctation inconspicuous except for three irregular series of hair bearing punctures (hairs not conspicuous) in the usual position for genus. *Venter*: Metacoxae sculp-

[1] Contribution No. 506 from the Department of Zoology, Indiana University, aided by a grant from the National Science Foundation.

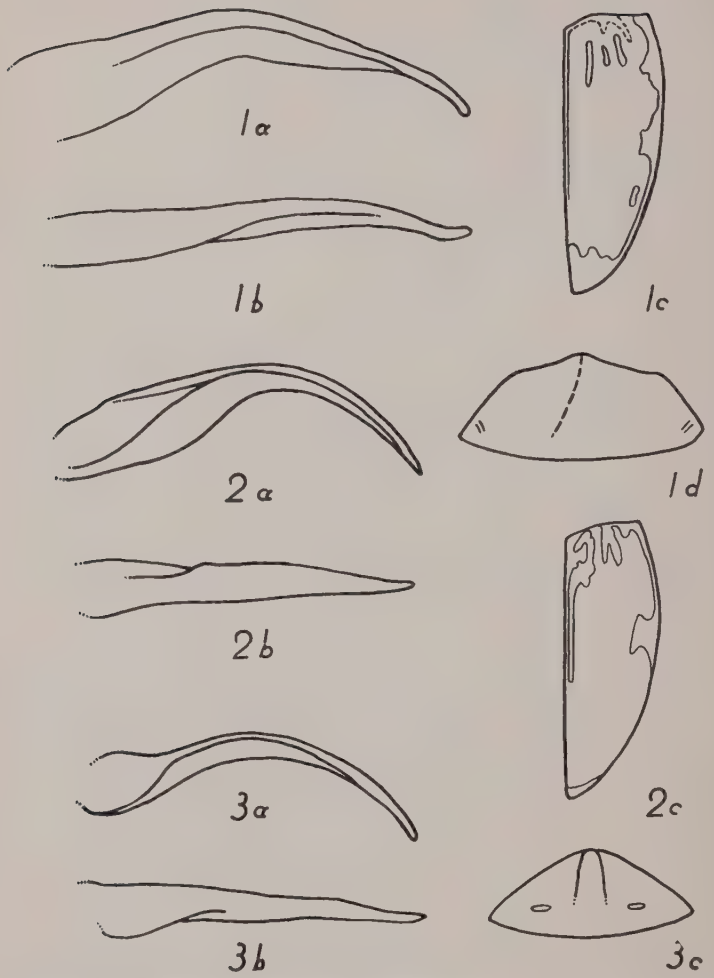

Figure 1. Holotype *Laccophilus vacaensis* sp. n. (a.) Lateral view of aedeagus. (b.) Dorsal view of aedeagus. (c.) Terminal abdominal sternite. (d.) Diagram of color pattern of elytron.

Figure 2. *Laccophilus proximus* Say. (a.) Lateral view of aedeagus. (b.) Dorsal view of aedeagus. (c.) Diagram of color pattern of elytron.

Figure 3. *Laccophilus venustus* Aubé. (a.) Lateral view of aedeagus. (b.) Dorsal view of aedeagus. (c.) Terminal abdominal sternite. Comparable structures drawn to same scale.

tured with minute strigae and minutely punctate *without* indication of *coxal file*. Scratches on abdominal sternites conspicuous. Terminal abdominal sternite impressed on left side (in normal position—head forward, venter down), not ridged medially but with hind margin sinuate on either side and obtusely produced at middle; some coarse hair-bearing punctures at the sides and with oblique scratches. Prosternal process similar to that of *proximus*, not expanded in apical third. *Anterior tarsi*: Four basal segments strongly dilated (very conspicuously so in comparison with *proximus* or *venustus*); fifth segment elongate, nearly three times as long as fourth (about 0.22 mm. in length). *Genitalia*: Dark brown in color. Parameres similar to those of *proximus*. Aedeagus stout with tip strongly bent to left and down when viewed from above (concave side down, tip away from observer), Fig. 1a, b. *Color*: Head, pronotum, and most of venter light yellowish brown. Abdominal sternites and legs darker brown. Base of head and apex of pronotum between eyes slightly darker (more definitely infuscate in other specimens in series). Elytra light yellowish brown to opaque whitish with the central portion rather evenly darkened by closely placed small brown spots which leave exposed various bands and spots of the lighter ground color. Color pattern in general similar to that of *proximus*, but differing in detail (see figs. 1d and 2c). Elytra darker in a broad indefinite band (less evident than in *proximus* and not at all suggesting the blotch of *fasciatus* Aubé) just before the lighter apices. A narrow strip along suture yellow orange. The light colored tips of the elytra, the broadly lighter margins, and the light basal streaks allow ready recognition of the species in the field.

ALLOTYPE FEMALE: Similar to male in color pattern and general structure but slightly smaller in size and with color more intense. Anterior tarsi only feebly dilated with the fifth segment about twice as long as the fourth. Sixth visible abdominal sternite rather acutely produced at middle of hind margin and elevated suggesting a median ridge, but without the sinuation of the hind margin seen in the male. Microsculpture on vertex of head more deeply impressed than in the male with the meshes more elongate; that of pronotum and elytra similar to male, but more deeply impressed giving the surface a duller appearance. Total length 4.28 mm.; greatest width 2.42 mm. Width at base of pronotum 1.84 mm.; width at apex of pronotum 1.27 mm.; length of pronotum at midline 0.73 mm. Length of prosternal process 0.54 mm.; base of prosternum to apex of elytra laminae 2.03 mm. Width between eyes 0.76 mm.

VARIATION: All specimens before me are similar except in the secondary sexual characters of males and females and in minor differences in the intensity and contrasts of the color pattern. All specimens are apparently slightly teneral although the genitalia are fully hardened.

TYPE LOCALITY: Holotype, allotype, and one male and three female paratypes are all from: FLORIDA: Vaca Key, near Marathon, August 22, 1949, collected by J. S. Haeger and F. N. Young. The specimens were found in a small freshwater pool in which the principal vegetation was *Chara* spp. The pool was drying up at the time, but the salinity was very low. It was completely unshaded, and the surface temperature in similar pools at noon was over 40 degrees centigrade.

LOCATION OF TYPES: Holotype, allotype, and two female paratypes are in the University of Michigan Museum of Zoology, Ann Arbor, Michigan. One male and one female paratype are in the collection of Mr. Hugh B. Leech at the California Academy of Sciences, San Francisco, California.

The foregoing description has necessitated several references to two other species of *Laccophilus* of which a brief discussion seems pertinent.

Laccophilus proximus Say—A preliminary study of numerous specimens of this species from many parts of the United States and the West Indies convinces me that it is a "rassenkreise" composed of a number of allopatric subspecies or geographic races. *L. maculosus* (Germ.) is distinct from this group, and I have seen no indication of intergradation. *Maculosus* and *proximus* occur together over a wide area from northern Georgia and Alabama northward. *Proximus* was described from South Carolina, and the population in the southeastern Coastal Plain of the United States should represent the typical subspecies.

In southern Florida the larger, darker form of the Coastal Plain is largely replaced by a smaller, somewhat more brightly colored form which occurs also in the West Indies. This latter is probably the *americanus* of Aubé, but the West Indian population is not uniform and it may be impossible to localize *americanus* exactly.

The accompanying figures were prepared from a specimen collected in southern Georgia. (Figs. 2a, b, c).

Laccophilus venustus Aubé—The type specimen of this species, according to Sharp (*Proc. Royal Dublin Soc.*, (Series 2), 2, 1882), is a female so that it will be difficult to establish the exact position of the species until males exactly comparable to the type are studied. I believe, however, that *venustus* should be placed in the group with short prosternal process and a distinct coxal file in the male only. I base this conclusion on the examination of a number of specimens which fit the original description, but in which the males have a definite coxal file and the females show no indication of such a structure. Several forms of the species probably occur in the West Indies.

The accompanying figures were prepared from a specimen collected in Jamaica, Gordon Tn. (Sta. 382), April 4, 1937 by R. E. Blackwelder and E. A. Chapin. (Figs. 3a, b, c.)

DR. HENRY TORSEY FERNALD

It is with profound regret that we report the passing of one of the older honorary members of our Society.

Dr. Henry Torsey Fernald, internationally known entomologist and educator, was called to his Supreme Reward on July 15, 1952, at his home in Winter Park, Florida.

Dr. Fernald was born at Litchfield, Maine, April 17, 1866. He came from an old, well known New England family. He was the son of Professor Charles H. Fernald, who was the first teacher in Entomology at the Massachusetts Agricultural College at Amherst and of Maria E. Fernald, who published the well known Catalogue of the Coccidae of the World.

Dr. Fernald received his Bachelors and Masters degrees at what is now the University of Maine in 1885 and his Doctors degree at Johns Hopkins University in 1890.

Dr. Fernald was Professor of Zoology at Pennsylvania State College from 1890 until 1899, also, State Zoologist during 1898-99. In 1899 he joined the faculty of the Massachusetts Agricultural College at Amherst where he became associated with his father who was head professor of Entomology. He became head of the department in 1910 upon the retirement of his father. He was, also, State Nursery Inspector from 1902 until 1918, as well as Entomologist of the Agricultural Experiment Station. He retired in 1930 following forty years of teaching well done and well remembered by his many students, co-workers and friends whose abodes reach around the world.

His text book, "Applied Entomology" has been widely used by students of two generations and is now in its fourth edition.

He was a member of a number of scientific and professional societies, including the American Association of Economic Entomology (President, 1914), the Entomological Society of America, the Boston Society of Natural History, the American Academy of Arts and Sciences, the A. A. A. S., and other scholarly groups including the Winter Park University Club.

He is survived by his wife, Minna R. of Winter Park, two daughters, Miss Helen E., of Toronto, Canada and Mrs. Carl B. Stone, of Cincinnati, Ohio, also, four grandsons and two great grandchildren.—G. B. Merrill.

NEWS AND COMMENTS

The names of the following new members of the Florida Entomological Society were inadvertently omitted from the list published in the last issue of the FLORIDA ENTOMOLOGIST.

Douglas, Robert W., Route 5, Box 105b, Gainesville, Fla.

Irwin, John D., 327 Menores Ave., Coral Gables, Fla.

Plumb, George H., Virginia Forest Service, Box 1368, Univ. Sta., Charlottesville, Va.

Robinson, Frank A., 710 N.W. 9th Ave., Gainesville, Fla.

Sapp, Dempsey R., 2220 N.W. 6th St., Gainesville, Fla.

* * * * *

Complete sets or individual back numbers of the FLORIDA ENTOMOLOGIST are still available at a reasonable cost, although the supply of some of the early issues is being rapidly depleted. If you are interested in completing your set, please contact the Business Manager, Mr. W. P. Hunter, Box 2425, University Station, Gainesville, Florida.

* * * * *

Make your plans now to attend the thirty-sixth annual meeting of the Florida Entomological Society to be held in Miami on September 10-11 at the McAllister Hotel.

* * * * *

Because of the pressing need for a comprehensive list of the insects of Florida, A. N. Tissot, Lewis Berner, and Louis C. Kuitert are collaborating in the compilation of such a list for publication. Although a list was contemplated some years ago by Dr. M. D. Leonard, the project as he envisioned it did not materialize. The accumulation of the vast amount of information that will be required will necessitate the cooperation of many people. In particular, the editors will require unpublished records of Florida insects now held in private collections; however, the compilers wish to make it clear that they do not intend to interfere with the publication of any studies now under way. Should anyone have insect records which they would like to contribute to the work, it would be appreciated if they would send them to Lewis Berner, Department of Biology, University of Florida, Gainesville, Florida.

REORGANIZATION OF THE FLORIDA STATE MUSEUM

I appreciate this opportunity to bring to the attention of readers of the FLORIDA ENTOMOLOGIST information about the reorganization of their State Museum. The Florida State Museum has enjoyed a period of solid growth, extending over thirty years, and is now in a position to expand its services.

In addition to those staff members charged with the Museum's exhibition program, there are being added to the staff curators whose primary responsibility will be to maintain extensive study collections and encourage investigations in which these collections play a role. The newly appointed Curator of Biological Sciences is Dr. J. C. Dickinson, Jr., Ornithologist, who will also continue his present association with the University of Florida, Department of Biology, as Assistant Professor.

We are in the process of inviting several of our professional colleagues from the various biological units of the University of Florida, of which the Museum is a department, to join the Museum's Board of Associates. This Board of Associates will eventually include several University entomologists whose research interests are related to the reorganized collections under the Museum's care.

The Florida State Museum plans to encourage increasing systematic study of the insects and arachnids of Florida, the southeastern states, and Carribean America.

ARNOLD B. GROBMAN
Director, Florida State Museum

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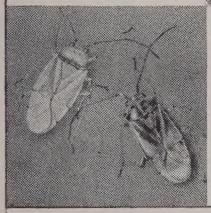

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